ABSTRACT:

The performance of a diagonal magnetohydrodynamic (MHD) accelerator has been numerically investigated. Studies were carried out using air plasma as a working gas in an equilibrium condition based on the MHD Augmented Propulsion Experiment channel designed by NASA. The MacCormack scheme is employed in order to solve the set of differential equations with MHD approximations. The fundamental performance of a diagonal MHD accelerator considering both flow performance along the channel and propulsion performance has been evaluated under various applied input currents and magnetic fields. The optimum performance is dominated by j ?? B Lorentz body force acceleration, while it is increased with Joule heating and the u ?? B term's contribution, which are detrimental to the propulsion performance. Moreover, friction forces resist the flow performance, particularly near the channel exit.